

## **REMARKS**

### **I. Introduction**

Claims 1 to 22 are now pending. In view of the following remarks, it is respectfully submitted that claims 1 to 22 are allowable, and reconsideration is respectfully requested.

### **II. Objection to the Specification**

As regards the objection to the Specification, the Specification has been amended herein without prejudice as suggested by the Examiner to include the section title “BRIEF SUMMARY OF THE INVENTION”. Accordingly, it is respectfully submitted that the Specification is in compliance with 37 C.F.R. 1.77 (b). Approval of the Specification is therefore respectfully requested.

### **III. Rejection of Claims 1 to 5 and 16 under 35 U.S.C. § 103(a)**

Claims 1 to 5 and 16 were rejected under 35 U.S.C. § 103(a) as unpatentable over “Intel Technology Journal Q3” by Nicholas P. Mencinger et al. (“Mencinger”) in view of “Application Specific Semiconductor Device Qualification Methodology” by M. Doty (“Doty”). It is respectfully submitted that claims 1 to 5 and 16 are allowable for at least the following reasons.

Claim 1 relates to a computer-implemented method to quantify the reliability test requirements of a package/chip device over a product lifetime, the method including modeling a plurality of different types of ambient and power-driven temperature cycle fluctuations the package/device is expected to undergo over the product lifetime, and determining the accelerated life test requirements that represent each of the plurality of different types of temperature cycles fluctuations.

Claim 4 relates to a method of relating accelerated life test parameters used to assess reliability of a package/chip device to expected frequencies and magnitudes of temperature cycle fluctuations encountered by the package/chip device over a product lifetime, the method including defining a particular market application use for the package/chip device, quantifying expected frequencies and magnitudes of temperature fluctuations of the package/chip device in each of a plurality of temperature cycle fluctuation regimes, based in part on the particular market application use of the package/chip device, and incorporating the quantified expected frequencies and magnitudes of the temperature fluctuations of the package/chip device in each of the temperature regimes into an accelerated life model.

In contrast to claims 1 and 4, Mencinger refers to a mechanism-based methodology for processor package assessments, in which failure mechanisms are modeled with the appropriate physical model. In this regard, Mencinger does not disclose, or even suggest, determining accelerated life test requirements that represent each of a plurality of different types of temperature cycles fluctuations a package/device is expected to undergo over the product lifetime, as recited by claim 1, or incorporating into the accelerated life model quantified expected frequencies and magnitudes of temperature fluctuations of a package/chip device in each of a plurality of temperature regimes over the product lifetime, as recited by claim 4. Indeed, the Office Action admits on pages 6 and 8 that Mercinger does not teach a plurality of temperature cycle fluctuation regimes nor accelerated life test requirements for all situations. Accordingly, Mencinger fails to disclose, or even suggest, the features of claims 1 and 4 with respect to determining the accelerated life test requirements that represent each of the plurality of different types of temperature cycles fluctuations a package/device is expected to undergo over a product lifetime, or incorporating into an accelerated life model quantified expected frequencies and magnitudes of temperature fluctuations of the package/chip device in each of a plurality of temperature regimes over the product lifetime.

Also in contrast to claims 1 and 4, Doty refers to a strategy for implementation of application specific characterization/qualification involving four application phases. See Slides 1 to 3. In this regard, Doty does not disclose, or even suggest, determining accelerated life test requirements that represent each of a plurality of different types of temperature cycle fluctuations a package/device is expected to undergo over a product lifetime, or incorporating into an accelerated life model quantified expected frequencies and magnitudes of temperature fluctuations of a package/chip device in each of a plurality of temperature regimes over the product lifetime. Instead, Doty simply refers to an application-specific semiconductor qualification methodology, in which certain stress conditions are provided that refer to temperature cycle fluctuations for only one application phase, namely, the operation life phase, but not in each of the four application phases. See Slide 3, which refers to a temperature range and a number of cycles for the “Package Temp Cycle”, “Interconnect Temp Cycle” and “Power Cycle” only for the operation life phase of the package/chip. In this regard, it is respectfully submitted that Doty does not consider temperature or power cycle fluctuations of other non-operational phases referred to on Slide 3, in particular, “Assembly” and “Storage/Transportation”, which would presumably also occur over a product lifetime.

Accordingly, Doty also fails to disclose, or even suggest, the features of claims 1 and 4 with respect to determining the accelerated life test requirements that represent each of the plurality of different types of temperature cycles fluctuations a package/device is expected to undergo over a product lifetime, or incorporating into an accelerated life model quantified expected frequencies and magnitudes of temperature fluctuations of the package/chip device in each of a plurality of temperature regimes over the product lifetime.

In rejecting a claim under 35 U.S.C. § 103(a), the Office Action bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

As explained above, the combination of Mencinger and Doty does not disclose, or even suggest, all of the features of claim 1 or claim 4, in particular, with respect to determining the accelerated life test requirements that represent each of the plurality of different types of temperature cycles fluctuations a package/device is expected to undergo over a product lifetime, or incorporating into an accelerated life model quantified expected frequencies and magnitudes of temperature fluctuations of the package/chip device in each of a plurality of temperature regimes over the product lifetime.

It also respectfully submitted that there is no motivation to combine Mencinger and Doty, as suggested by the Office Action, nor is there any motivation to modify the mechanism-based methodology disclosed by Mencinger, in the manner contemplated by claims 1 and 4.

The Office Action asserts “that a skilled artisan would have made an effort to become aware of what capabilities had been developed in the market place, and hence would have knowingly modified Mencinger with the teachings of Doty” but such assertions are clearly speculative suggestions on the part of the Examiner alone with no supportive basis in the references cited. The cases of In re Fine, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that if the Office Action reflects a

subjective “obvious to try” standard, it does not constitute proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . **One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.**

In re Fine, 5 U.S.P.Q.2d at 1600 (citations omitted; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .

**Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].**

In re Jones, 21 U.S.P.Q.2d at 1943 & 1944 (citations omitted; italics in original). Thus, the proper evidence of obviousness must show why there is a suggestion to combine the references so as to provide the subject matter of the claims and its benefits. Such showing is lacking in this Office Action.

Moreover, it is respectfully submitted that a *prima facie* case of obviousness has not been made in the present case, since the Office Action never made any findings, such as, for example, regarding what the ordinary skill level in the art would have been at the time the claimed subject matter of the present application was made. (See In re Rouffet, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998) (the “factual predicates underlying” a *prima facie* “obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art”)). It is respectfully submitted that the proper test for showing obviousness is what the “combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art,” and that the Patent Office must provide particular findings in this regard — the evidence for which does not include “broad conclusory statements standing alone.” (See In re Kotzab, 55 U.S.P.Q. 2d 1313, 1317 (Fed. Cir. 2000) (citing In re Dembiczak, 50 U.S.P.Q.2d 1614, 1618 (Fed. Cir.

1999) (obviousness rejections reversed where no findings were made “concerning the identification of the relevant art,” the “level of ordinary skill in the art” or “the nature of the problem to be solved”))). It is again respectfully submitted that there has been no such showing by the Office Action.

In short, the Office has failed to carry the initial burden of presenting a proper prima facie case of obviousness. (See In re Oetiker, 977 F.2d 1443, 1445, 24, U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992)).

In view of the foregoing, it is respectfully submitted that claims 1 and 4 are allowable.

Claims 2 and 3 depend from claim 1, and are therefore allowable for at least the same reasons as claim 1.

Claim 5 depends from claim 4, and is therefore allowable for at least the same reasons as claim 4.

Claim 16 recites features essentially analogous to claim 4, and is therefore allowable for at least the same reasons as claim 4. Moreover, claim 16 further recites quantifying frequencies and magnitudes of temperature fluctuations based in part on the shipping route taken by the product, which is neither disclosed nor suggested by Mencinger and/or Doty. The Office Action asserts on pages 8 to 9 that because Appendix A of the Doty reference refers to seasonal variation of the temperature it would be obvious to one skilled in the art at the time the invention was made to model similar temperature relationships based on shipping routes. However, such relationships are clearly not similar, since, for example, the seasonal temperature variations referred to by Doty involve an overall trending of the temperature data occurring over a long period time, rather than an immediate impact as would be expected by the product taking a different shipping route. Hence, the seasonal temperature variation is used by Doty to create a year-long baseline temperature onto which the daily fluctuations are superimposed, rather than quantifying the frequencies and magnitudes of temperature fluctuations pertinent to each identified ambient and power driven temperature fluctuation, as required by claim 16.

In sum, it is therefore respectfully submitted that claims 1 to 5 and 16 are allowable. Accordingly, it is respectfully requested that the obviousness rejections be withdrawn.

#### **IV. Rejection of Claims 6 to 12, 14 and 17 to 22 under 35 U.S.C. § 103(a)**

Claims 6 to 12, 14 and 17 to 22 were rejected under 35 U.S.C. § 103(a) as unpatentable over Mencinger in view of Doty and “ReliaSoft’s ALTA 1.0 On Site Training Guide” (“ReliaSoft”). Claims 6 to 12, 14 and 17 to 22 depend either directly or indirectly

from claims 1, 4 and 16, or recite features essentially analogous to at least one of claims 1, 4 and 16, or depend from a claim that recites features essentially analogous to at least of claims 1, 4 and 16, and are therefore allowable for at least the same reasons as claims 1, 4, and/or 16, since the ReliaSoft reference does not cure the critical deficiencies of the Mencinger and Doty references, as explained above.

**V. Rejection of Claims 13 and 15 under 35 U.S.C. § 103(a)**

Claims 13 and 15 were rejected under 35 U.S.C. § 103(a) as unpatentable over Mencinger in view of Doty, ReliaSoft and “Semiconductor Device Reliability Failure Models by Ted Dellin et al. (“Dellin”). Claims 13 and 15 depend indirectly from claim 4, and are therefore allowable for at least the same reasons as claim 4, since the ReliaSoft and Dellin references do not cure the critical deficiencies of the Mencinger and Doty references, as explained above.

**CONCLUSION**

In view of all of the above, it is respectfully submitted that all of the presently pending claims are allowable. It is therefore respectfully requested that the rejections be withdrawn. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is respectfully requested.

Respectfully submitted,

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By:

  
Michael P. Paul  
(Reg. No. 53,443)

KENYON & KENYON  
One Broadway  
New York, New York 10004  
(212) 425-7200

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